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THE CHROMOSOMES OF SADLERIA (BLECHNACEAE)

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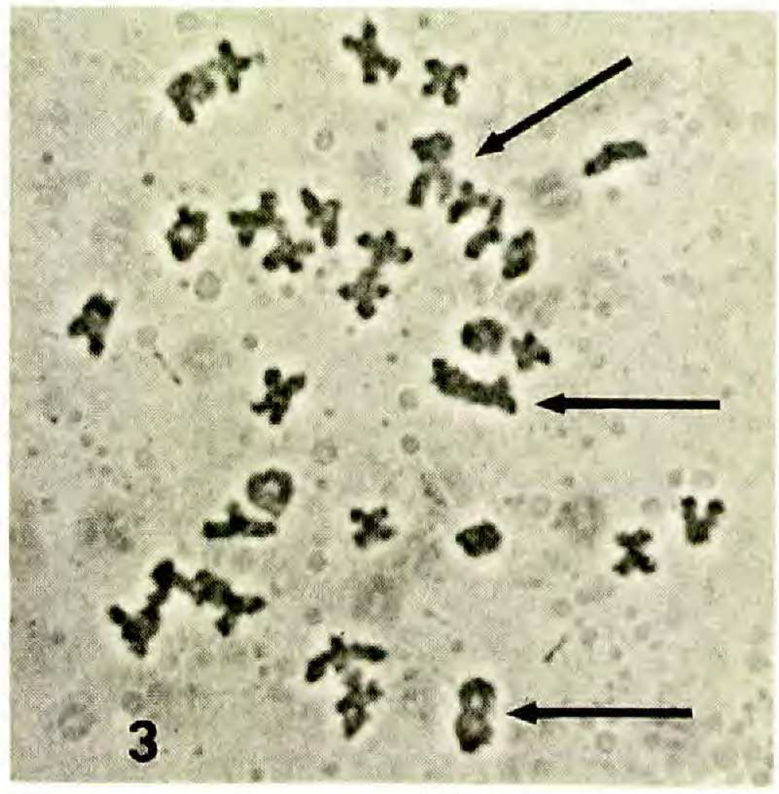
An accurate chromosome count for *Sadleria*, a genus of ferns endemic to the Hawaiian Islands (Fig. 1), has been remarkably difficult to obtain. Efforts to determine the number of pairs at meiosis have been made sporadically since 1965, and the frustration has been exacerbated by the fact that the number of pairs (32–35) is obviously not unusually high in terms of pteridophyte chromosomes. The number of spore mother cells available in any preparation, however, is low, since only 16 spores are produced in each sporangium (Fig. 2) instead of the more usual 64. The chromosome figures have shown complete pairing, and therefore the difficulties in interpretation did not lie with distinguishing pairs and univalents. The problem involves separating which are the actual pairs. Figure 3 illustrates a typical chromosome squash for *Sadleria,* with arrows indicating the areas difficult to interpret.

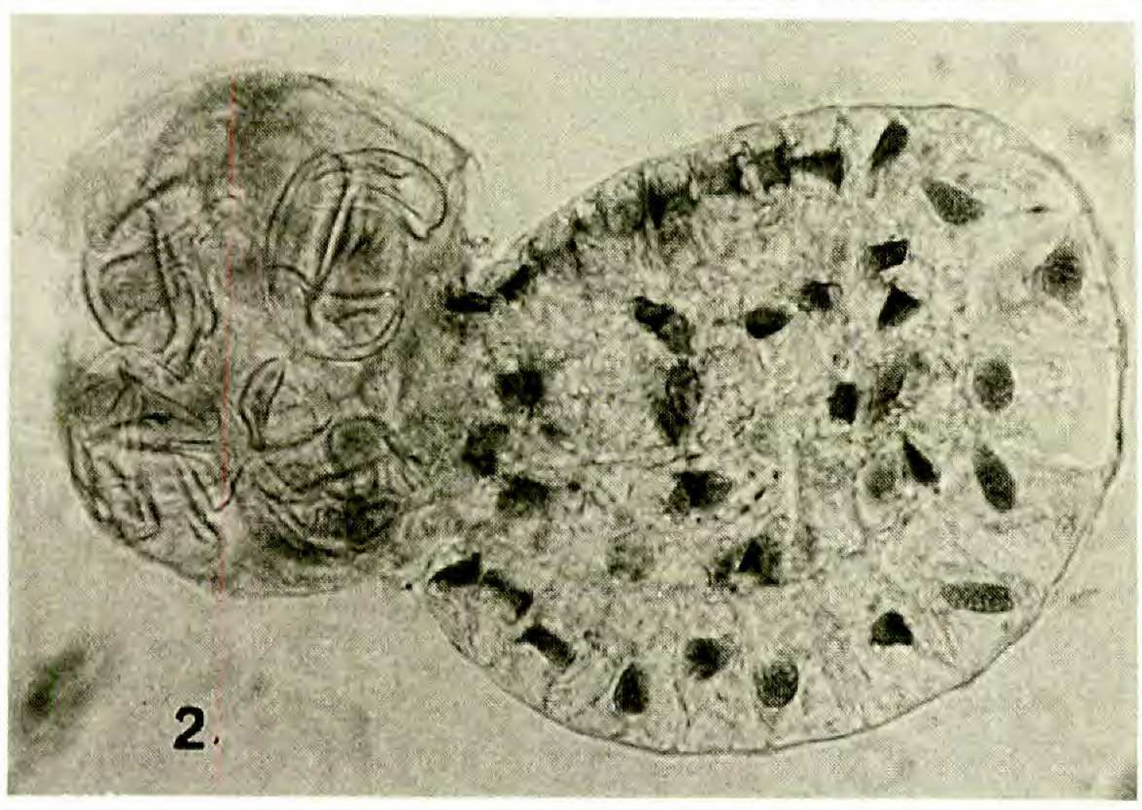
Recently a chromosome figure for *Sadleria squarrosa* (Gaud.) T. Moore, from East Maui, was obtained in which the chromosomes appeared to be more condensed than usual, and the pairs well separated. These showed an unmistakable count of 33 pairs (Fig. 4). The figure illustrated here also reveals the source of the problem—the fact that the meiotic pairs of *Sadleria* chromosomes are not uniform in length. One or two pairs are approximately twice the size of the smaller ones. Most of the chromosome pairs, when drawn at the same level, are of the same size and small, but the larger ones clearly account for problems in determining an accurate count in those figures with less condensed chromosomes.

On a visit in 1970 the late Stanley Walker took some of my early *Sadleria* chromosome slides back with him to the University of Liverpool to see what he could make of the chromosome count. In a letter he wrote that he was quite certain the number was 35. In 1973 Trevor Walker (The University, Newcastle upon Tyne), referring to the family Blechnaceae, and specifically to the genus *Blechnum*, which has an aneuploid series of chromosome numbers from 28 to 36, wrote, "There is a suspicion that possibly the primitive number in the genus [*Blechnum*] is 33, this being found in *Brainea* and also in *Sadleria* as determined by myself from some preparations made by Professor [Irene] Manton. Chromosomes in *Blechnum* appear to have been gained or lost from this central number." No photograph or illustration accompanied this statement.

In published chromosome counts for the closely related genus *Blechnum* (Löve et al. 1977) the number $n = 33$ and the tetraploids based on this number, appear 18 times out of 94 published reports. The number $n = 34$ pairs plus tetraploids based on 34 appear twice as often, 36 times. One is tempted to speculate that in *Sadleria* the large chromosomes represent fusion products reducing 34 pairs to 33.

Reinterpretation of my older slides, bearing in mind the existence of one or more large chromosome pairs, indicates that 33 pairs is the meiotic number to be found in other species of the genus, e.g., *S. souleyetiana* (Gaud.) T. Moore and *S. pallida* Hook. & Arn., and likely will be found throughout the genus.





FIGS. 1–4. *Sadleria cyatheoides* and *S. quarrosa*. Fig. 1. *S. cyatheoides*, Oahu, Mt. Kaala. Fig. 2. Sporangium of *S. cyatheoides* showing 16 immature spores in four tetrads (*W. H. Wagner 84075*, West Maui). Fig. 3. Meiosis in *S. squarrosa* (*Hobdy 4250*, East Maui). Arrows indicate problem areas. Fig. 4. Meiosis in *S. squarrosa* (*W. H. Wagner 87163*, East Maui), $n = 33$ pairs.

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